

reacting the silicon and the carbon in the presence of the plasma to deposit a silicon carbide layer having a dielectric constant less than 7.0 on the substrate in the chamber;

depositing a first dielectric layer *in situ* on the silicon carbide layer; and then depositing a photoresist layer.

15. The method of claim 14, further comprising:

depositing a silicon carbide etch stop *in situ* on the first dielectric layer; and

depositing a second dielectric layer *in situ* on the silicon carbide etch stop prior to depositing the photoresist layer.

16. The method of claim 15, further comprising depositing a silicon carbide anti-reflective coating *in situ* on the second dielectric layer prior to depositing the photoresist layer.

17. The method of claim 15, wherein the photoresist layer is deposited on the second dielectric layer.

18. The method of claim 14, further comprising:

depositing a silicon carbide layer on the first dielectric layer prior to depositing the photoresist layer.

19. The method of claim 14, further comprising depositing a silicon carbide anti-reflective coating *in situ* on the first dielectric layer prior to depositing the photoresist layer.

20. The method of claim 14, wherein the substrate has an effective dielectric constant of no greater than about 5.

21. The method of claim 14, wherein the silicon and the carbon are derived from an organosilane compound, substantially independent of other carbon sources.

22. The method of claim 14, wherein the silicon and the carbon are derived from a common source, and reacting the silicon and the carbon in the presence of the plasma to form silicon carbide occurs independent of the presence of a separate hydrogen source.

23. The method of claim 14, wherein the silicon and the carbon are derived from a common source and reacting the silicon and the carbon in the presence of the plasma to form silicon carbide occurs independent of the presence of a separate carbon source.

24. The method of claim 14, further comprising patterning and etching the substrate to form a damascene structure.

25. The method of claim 14, wherein the silicon carbide layer is an anti-reflective coating that has a single selected thickness to produce a reflectivity of about 7 percent or less when an underlying dielectric layer below the anti-reflective coating has a thickness from about 5000 Å to about 10000 Å.

26. A method of *in situ* deposition of silicon carbide on a substrate, comprising:
depositing a silicon carbide barrier layer on the substrate;
depositing a first dielectric layer *in situ* on the barrier layer;
depositing an etch stop *in situ* on the first dielectric layer;
depositing a second dielectric layer *in situ* on the etch stop;
depositing a silicon carbide anti-reflective coating *in situ* on the second dielectric layer; and
depositing a photoresist layer on the silicon carbide anti-reflective coating.

27. The method of claim 26, wherein the barrier layer, etch stop, and anti-reflective coating each comprises silicon carbide material having a dielectric constant less than 7.0.